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Proton conductivity porous film for ion exchange membrane and separator for capacitor, has preset porosity, and contains aliphatic hydrocarbon polymer having sulfonic acid group and proton acid

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NOVELTY

The porosity of the aliphatic hydrocarbon polymer porous film having sulfonic acid group, is 0.01-5 milliequivalent/g. The film contains a proton acid.

DETAILED DESCRIPTION

An INDEPENDENT CLAIM is also included for the manufacture of the proton conductivity film. After adjusting the porosity of the polymer film having sulfonic acid group, to 0.01-5 milliequivalent/g, a proton acid is impregnated to the film. The porous film is then heated and melted such that porosity is reduced.

USE

For ion exchange membrane, separator for capacitor and solid electrolyte for fuel cells.

ADVANTAGE

Electrical conductivity of the porous film is excellent.

EXAMPLE

15 weight parts (wt.pts) of ultra-high molecular weight polyethylene resin and 85 wt.pts of liquid paraffin were mixed to form a slurry. Kneading was performed for 5 minutes at 160°C. Molding was performed to obtain a gel-like sheet of thickness 5 mm, followed by cooling. The sheet was heat pressed, immersed in n-heptane and subjected to simultaneous biaxial orientation at 125°C. Solvent was removed to obtain a porous film of film thickness 50 μm, porosity 58% and average pore size 0.04 μm. The porous film was subjected to gaseous phase sulfonation, to obtain a sulfonated porous film of thickness 60 μm, porosity 45% and average pore size 0.05 μm. The sulfonated porous film was immersed in 60 weight% of ethylene glycol solution of polyphosphoric acid, and was impregnated.

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Electrical conductivity of the sulfonated porous film was evaluated and found to be 3×10^{2} S/cm.

TECHNOLOGY FOCUS

Polymers - Preferred Film: The aliphatic hydrocarbon polymer porous film is a polyolefin resin film, preferably ultra-high molecular weight polyethylene resin porous film. The sulfonic acid group performs gaseous phase sulfonation of the polymer porous film. The film is subjected to melting.

Inorganic Chemistry - Preferred Acid: The protonic acid is sulfuric acid, phosphoric acid, polyphosphoric acid or sulfonic acid.

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